THAT WHICH IS CLAIMED:

1. An apparatus for measuring characteristics of a hole, the apparatus comprising:

at least one optical fiber capable of being introduced into the hole, wherein said optical fiber directs light radially toward a hole wall and receives light reflected off the hole wall;

a light source for providing light to said optical fiber; and

an optical receiver for receiving light from said optical fiber that has reflected off the hole wall and been received by said optical fiber, said optical receiver also adapted to measure the intensity of the light reflected off the hole wall so as to permit different materials to be distinguished.

2. The apparatus of claim 1, wherein said optical fiber is capable of being introduced into the hole without contacting the hole wall.

3. The apparatus of claim 1, wherein the hole is defined by a stack of at least two materials, and further comprising means for distinguishing between the different materials of the stack and identifying an interface therebetween based upon the intensity of the light reflected off the hole wall.

4. The apparatus of claim 1, further comprising means for distinguishing between a material that defines the hole and air so as to identify the backside of the hole.

5. The apparatus of claim 1, further comprising a collimating lens in optical communication with a distal end of said optical fiber for transmitting collimated light toward the hole wall.

6. The apparatus of claim 1, further comprising a focal lens in optical communication with a distal end of said optical fiber for transmitting focused light toward the hole wall and wherein said optical fiber is moveable in a

radial direction in order to coincide the focal point of the light with the hole wall.

7. The apparatus of claim 6, wherein said optical fiber is rotatable to permit the distance to the hole wall to be measured at various points about the circumference.

8. The apparatus of claim 1, further comprising a movable mirror and an optical splitter for directing light from said light source both to said movable mirror and said optical fiber, wherein said optical receiver measures the intensity of the light reflected off the hole wall and the intensity of the light reflected off the mirror as the mirror is translated in order to determine the distance from a distal end of said optical fiber to the hole wall.

9. The apparatus of claim 8, wherein said optical fiber is rotatable to permit the distance to the hole wall to be measured at various points about the circumference.

10. The apparatus of claim 1, further comprising a position feedback device for determining the linear position of said optical fiber relative to the hole wall.

11. The apparatus of claim 1, further comprising a display for representing the measurements of the characteristics of the hole.

12. A hole probe apparatus nose assembly, comprising:

a nose piece comprising a frusto conical section tapering radially inward in a forward direction and an extending member disposed rearward of the frusto conical section;

a spring surrounding the extending member of said nose piece;

a housing surrounding the extending member of said nose piece and said spring, wherein a forwardly facing side of said housing defines an

opening through which the frusto conical section of said nose piece extends; and

a retainer ring capable of being attached to the forwardly facing side of said housing around the opening, wherein said retainer ring partially covers the opening such that said nose piece and said spring are prevented from being removed from said housing through the opening.

13. The nose assembly of claim 12, wherein said nose piece and said spring are held within said housing such that said spring surrounding the extending member of said nose piece is partially compressed.

14. The nose assembly of claim 12, wherein the extending member comprises a first section disposed rearward of the frusto conical section and a second section having a smaller width than the first section and disposed rearward of the first section, and wherein said spring surrounds the second section of the extending member.

15. The nose assembly of claim 12, wherein said nose piece is capable of measuring the dimensions of the hole in which said nose piece is partially inserted.

16. The nose assembly of claim 12, further comprising at least one optical fiber capable of extending through said nose piece, spring and housing and being introduced into a hole, wherein said optical fiber directs light radially toward a hole wall and receives light reflected off the hole wall.

17. A method for measuring characteristics of a hole, the method comprising:

introducing at least one optical fiber into the hole;

transmitting light along the optical fiber and directing light from a distal end of the optical fiber toward the hole wall;

receiving light with the distal end of the optical fiber that has reflected off the hole wall, wherein receiving light comprises measuring the intensity of the light reflected off the hole; and

distinguishing between different materials based upon the intensity of the light reflected off the hole.

18. The method of claim 17, wherein introducing at least one optical fiber into the hole comprises introducing the optical fiber without contacting the hole wall.

19. The method of claim 17, wherein the hole is defined by a stack of at least two materials, and wherein distinguishing between different materials also comprises distinguishing between the different materials of the stack and of identifying an interface therebetween.

20. The method of claim 17, wherein distinguishing between different materials also comprises distinguishing between a material that defines the hole and air so as to identify the backside of the hole.

21. The method of claim 17, further comprising providing a collimating lens in optical communication with a distal end of the optical fiber for transmitting collimated light toward the hole wall.

22. The method of claim 17, further comprising providing a focal lens in optical communication with a distal end of the optical fiber for transmitting focused light along the optical fiber toward the hole wall and moving the optical fiber in a radial direction in order to coincide the focal point of the light with the hole wall.

23. The method of claim 22, further comprising rotating the optical fiber and measuring the distance to the hole wall at various points about the circumference.

24. The method of claim 17, further comprising providing a movable mirror and an optical splitter for directing light from the light source both to the movable mirror and the optical fiber and wherein receiving light also comprises measuring the intensity of the light reflected off the hole wall and the intensity of the light reflected off the mirror as the mirror is translated in order to determine the distance from a distal end of the optical fiber to the hole wall.

25. The method of claim 24, further comprising rotating the optical fiber and measuring the distance to the hole wall at various points about the circumference.

26. The method of claim 17, further comprising determining the linear position of the optical fiber relative to the hole wall.